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On Mann implicit iterations for strongly accretive and strongly pseudo-contractive mappings ☆

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Abstract

For a Lipschitz strongly accretive map considered by Chidume in [C.E. Chidume, Picard iteration for strongly accretive and strongly pseudo-contractive Lipschitz maps, ICTP Preprint No. IC2000098; C.E. Chidume, Iterative algorithms for nonexpansive mappings and some of their generalizations, Nonlinear analysis and applications: to V. Lakshmikantam on his 80th birthday, vols. 1 and 2, Kluwer Acad. Publ., Dordrecht, 2003, pp. 383–429], it is known that a classical Picard-type iteration process converges strongly to a zero of the operator. He also proved that the rate of convergence, in this case, is at least as fast as a geometric progression. In this paper we study the Mann implicit iteration sequence for strongly accretive and strongly pseudo-contractive mappings. We showed that this implicit scheme gives better convergence rate estimate. Presented results improve the corresponding results of [C.E. Chidume, Picard iteration for strongly accretive and strongly pseudo-contractive Lipschitz maps, ICTP Preprint No. IC2000098; C.E. Chidume, Iterative algorithms for nonexpansive mappings and some of their generalizations, Nonlinear analysis and applications: to V. Lakshmikantam on his 80th birthday, vols. 1 and 2, Kluwer Acad. Publ., Dordrecht, 2003, pp. 383–429; L. Liu, Approximation of fixed points of a strictly pseudo-contractive mapping, Proc. Am. Math. Soc. 125 (2) (1997) 1363–1366; W.R. Sastry, G.V.R. Babu, Approximation of fixed points of strictly pseudo-contractive mappings on arbitrary closed, convex sets in a Banach space, Proc. Amer. Math. Soc. 128 (2000) 2907–2909; Y. Song, R. Chen, Viscosity approximative methods to Cesàro means for non-expansive mappings, Appl. Math. Comput. 186 (2) (2007) 1120–1128].

Keywords: Banach space; Lipschitzian mappings; Strongly pseudo-contractive mappings; Strongly accretive mappings; Mann implicit iteration scheme

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